AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. – 41. (Cancelled)

42. (Previously Presented) A plasma etching apparatus according to claim 51, further comprising:

means for decreasing the amount of fluorine in the plasma to decrease the amount of fluorine near the sample, said decreasing means comprising an electrode cover comprising a material containing Si or C on the other of the pair of plate electrodes to react with fluorine and setting a gap between said pair of plate electrodes to 30 mm to 60 mm.

43. (Previously Presented) A plasma processing apparatus according to claim 42, wherein the gas introducing means has a gas diffusion plate, and the electrode cover situated downstream of the gas diffusion plate has fine plural apertures.

44. – 45. (Cancelled)

46. (Previously Presented) A plasma etching apparatus according to claim 42, wherein a discharge confining ring and/or a susceptor cover containing Si or C is situated near the sample.

47. (Previously Presented) A plasma etching apparatus according to claim 46, wherein the insulator between the susceptor cover and the sample table has a thickness of 0.5 mm to 5 mm.

48. – 49. (Cancelled)

50. (Currently Amended) A plasma processing apparatus according to claim 42 further comprising a bias electric power source connected to said one electrode used as a sample table for applying a bias voltage to said sample table.

51. (Currently Amended) A plasma etching apparatus comprising a vacuum processing chamber and a pair of electrodes opposite to each other that are disposed in said vacuum processing chamber, one of said electrodes being used also as a sample table capable of holding a sample having a diameter of 300 mm or more containing an insulator film,

wherein said plasma etching apparatus further comprises:

a gas introducing means for introducing an etching gas containing at least fluorine and carbon into said vacuum processing chamber;

means for applying a high-frequency electric power of 30 MHz to 300 MHz between said pair of electrodes whose gap is set to 30 mm to 100 mm and for

setting an atmospheric pressure inside said vacuum processing chamber to 0.4 Pa to 4.0 Pa to generate a plasma with a density of 5 x 10^{10} cm^{-3} to ~~5 x 10^{11} c^{-3} between~~ 5 x 10^{11} cm^{-3} between said pair of electrodes to etch a fine pattern of 0.2 μm or smaller on said sample; and

a bias electric power source connected to one of said electrodes to control energy of ions in said plasma.

52. (Canceled)

53. (Previously Presented) A plasma etching apparatus according to claim 51, where said one of said electrodes is provided with an electrostatic attracting film, heat transfer gas being supplied between said electrostatic attracting film and a back surface of said sample.

54. (Canceled)

55. (Previously Presented) A plasma etching apparatus according to claim 51, wherein said gap is set to a distance capable of utilizing surface reaction between said pair of electrodes effectively to decrease the amount of fluorine in said plasma near said sample.

56. (New) A plasma etching apparatus according to claim 51, wherein the means for setting the atmospheric pressure sets it to 1.0 Pa to 4.0 Pa.

57. (New) A plasma etching apparatus comprising a vacuum processing chamber and a pair of electrodes opposite to each other that are disposed in said vacuum processing chamber, one of said electrodes being used also as a sample table capable of holding a sample having a diameter of 300 mm or more containing an insulator film,

wherein said plasma etching apparatus further comprises:

a gas introducing means for introducing an etching gas containing at least fluorine and carbon into said vacuum processing chamber;

means for generating a plasma with a density of 5×10^{10} cm^{-3} to 5×10^{11} cm^{-3} between said pair of electrodes to provide a substantially uniform plasma over said sample having a diameter of 300 mm or more to etch a fine pattern of 0.2 μm or smaller on said sample; and

a bias electric power source connected to one of said electrodes to control energy of ions in said plasma.

58. (New) A plasma etching apparatus according to claim 57, where said one of said electrodes is provided with an electrostatic attracting film, heat transfer gas being supplied between said electrostatic attracting film and a back surface of said sample.

59. (New) A plasma etching apparatus according to claim 57, wherein said gap is set to a distance capable of utilizing surface reaction between said pair of electrodes effectively to decrease the amount of fluorine in said plasma near said sample.

60. (New) A plasma etching apparatus according to claim 57, wherein the means for setting the atmospheric pressure sets it to 1.0 Pa to 4.0 Pa.

61. (New) A plasma etching apparatus according to claim 57, further comprising:

means for decreasing the amount of fluorine in the plasma to decrease the amount of fluorine near the sample, said decreasing means comprising an electrode cover comprising a material containing Si or C on the other of the pair of plate electrodes to react with fluorine and setting a gap between said pair of plate electrodes to 30 mm to 60 mm.

62. (New) A plasma processing apparatus according to claim 61, wherein the gas introducing means has a gas diffusion plate, and the electrode cover situated downstream of the gas diffusion plate has fine plural apertures.

63. (New) A plasma etching apparatus according to claim 61, wherein a discharge confining ring and/or a susceptor cover containing Si or C is situated near the sample.

64. (New) A plasma etching apparatus according to claim 63, wherein the insulator between the susceptor cover and the sample table has a thickness of 0.5 mm to 5 mm.

65. (New) A plasma processing apparatus according to claim 61 further comprising a bias electric power source connected to said one electrode used as a sample table for applying a bias voltage to said sample table.

66. (New) A plasma etching apparatus comprising a vacuum processing chamber and a pair of electrodes opposite to each other that are disposed in said vacuum processing chamber, one of said electrodes being used also as a sample table capable of holding a sample having a diameter of 300 mm or more containing an insulator film,

wherein said plasma etching apparatus further comprises:

a gas introducing means for introducing an etching gas containing at least fluorine and carbon into said vacuum processing chamber;

means for setting an atmospheric pressure inside said vacuum processing chamber to 0.4 Pa to 4.0 Pa to generate a plasma with a density of 5×10^{10} cm^{-3} to 5×10^{11} cm^{-3} between said pair of electrodes to etch a fine pattern of 0.2 μm or smaller on said sample; and

a bias electric power source connected to one of said electrodes to control energy of ions in said plasma.

67. (New) A plasma etching apparatus according to claim 66, where said one of said electrodes is provided with an electrostatic attracting film, heat transfer gas being supplied between said electrostatic attracting film and a back surface of said sample.

68. (New) A plasma etching apparatus according to claim 66, wherein said gap is set to a distance capable of utilizing surface reaction between said pair of electrodes effectively to decrease the amount of fluorine in said plasma near said sample.

69. (New) A plasma etching apparatus according to claim 66, wherein the means for setting the atmospheric pressure sets it to 1.0 Pa to 4.0 Pa.

70. (New) A plasma etching apparatus according to claim 66, further comprising:

means for decreasing the amount of fluorine in the plasma to decrease the amount of fluorine near the sample, said decreasing means comprising an electrode cover comprising a material containing Si or C on the other of the pair of plate electrodes to react with fluorine and setting a gap between said pair of plate electrodes to 30 mm to 60 mm.

71. (New) A plasma processing apparatus according to claim 70, wherein the gas introducing means has a gas diffusion plate, and the electrode cover situated downstream of the gas diffusion plate has fine plural apertures.

72. (New) A plasma etching apparatus according to claim 70, wherein a discharge confining ring and/or a susceptor cover containing Si or C is situated near the sample.

73. (New) A plasma etching apparatus according to claim 72, wherein the insulator between the susceptor cover and the sample table has a thickness of 0.5 mm to 5 mm.

74. (New) A plasma processing apparatus according to claim 70 further comprising a bias electric power source connected to said one electrode used as a sample table for applying a bias voltage to said sample table.

75. (New) A plasma etching apparatus comprising a vacuum processing chamber and a pair of electrodes opposite to each other that are disposed in said vacuum processing chamber, one of said electrodes being used also as a sample table capable of holding a sample having a diameter of 300 mm or more containing an insulator film, wherein said plasma etching apparatus further comprises:

a gas introducing means for introducing an etching gas containing at least fluorine and carbon into said vacuum processing chamber;

a magnetic field forming means for forming a magnetic field designed to generate increased plasma at the portion within an outer periphery of said sample which is greater than the plasma at the center of said sample, the magnetic field forming means producing an intensity of the magnetic field on said sample smaller than 30 gauss,

means for applying a high-frequency electric power of between only 30 MHz and 300 MHz between said pair of electrodes, and for setting the gap between said pair of electrodes of between only 30 mm and 100 mm, and for setting an atmospheric pressure inside said vacuum processing chamber of between only 0.4

Pa and 4.0 Pa, and for setting the magnetic field value only to a value smaller than 30 gauss, in order to maintain a plasma density within a range of between 5×10^{10} cm^{-3} and 5×10^{11} cm^{-3} between said paid of electrodes to etch a fine pattern of 0.2 μm or smaller on said sample; and

a bias electric power source connected to one of said electrodes to control energy of ions in said plasma.

76. (New) An apparatus as in claim 75, wherein said vacuum processing chamber improves workability on a sample at a plasma density within a range of between 5×10^{10} cm^{-3} and 5×10^{11} cm^{-3}.

77. (New) An apparatus as in claim 75, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.

78. (New) An apparatus as in claim 76, wherein the magnetic field forming means includes a pair of coils each having a position and a diameter to generate increased plasma at the portion within the outer periphery of the sample which is greater than the plasma at the center of the sample.